5.8 Radical Equations and Inequalities

radical equations--equation with a radical containing variables in the radicand

ex:
$\sqrt{2x - 1} = 3$ (2) (2)

Steps
1. Isolate the radical
2. "Square" both sides
3. Solve for x
4. Check

$2x - 1 = 9$
$x = 5$ ✓

ex:
$2\sqrt[3]{x} - 1 = 3$

$2\sqrt[3]{x} = 4$
$\sqrt[3]{x}^3 = 2^3$
$x = 8$ ✓

ex:
$3x - 5\sqrt{x} = 2$

$x^{\frac{1}{2}} \cdot x^{\frac{1}{3}}$ $(a+b)^2 = a^2 + 2ab + b^2$

$(-5\sqrt{x})^2 = (-3x + 2)^2$

$25x = 9x^2 - 12x + 4$
$0 = 9x^2 - 37x + 4$
$0 = (x - 4)(9x - 1)$

$x = 4$ ✓ 0
$x = \frac{1}{9}$ ✗

Do:

$\sqrt{7x - 12} = x$

$7x - 12 = x^2$

$0 = x^2 - 7x + 12$

$(x-3)(x-4)$

$\{3, 4\}$

Double

ex:

$\sqrt{2x + 5} = 2\sqrt{2x} + 1$

$(2\sqrt{2x}+1)(2\sqrt{2x}+1)$

$4 \cdot 2x$

$8x + 2\sqrt{2x} + 1$

$2x + 5 = 8x + 4\sqrt{2x} + 1$

$-6x + 4 = 4\sqrt{2x}$

$(-3x + 2)^2 = (2\sqrt{2x})^2$

$9x^2 - 12x + 4 = 8x$

$9x^2 - 20x + 4 = 0$

$0 = (9x - 2)(x - 2)$

$x = \frac{2}{9}$ $x \neq 2$

Inequalities

ex:

$\sqrt{3x + 6} + 2 \leq 5$

$\sqrt{3x+6}^2 \leq 3^2$

$3x + 6 \leq 9$

$3x \leq 3$

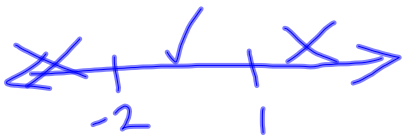
$x \leq 1$

Radicand ≥ 0

$3x + 6 \geq 0$

$3x \geq -6$

$x \geq -2$



Check 3 regions

$-2 \leq x \leq 1$

HW
p266
15-35odd